

Appendix 1

Proposed Davis Municipal Wood Smoke Ordinance

[Article 39A.01 GENERAL PROVISIONS](#)

[39A.01.010 Purpose.](#)

The purpose of this chapter is to limit emissions of particulate matter to the atmosphere from fires or the operation of wood burning devices during periods of time when air quality is unhealthy for sensitive populations. (Ord. 2397 § 1, 2012; Ord. 2398 § 1, 2012)

[39A.01.020 Definitions.](#)

For purposes of this chapter, the following words and phrases shall have the following meanings:

- (a) **Interior space** means any indoor area which is designed and used for human occupancy.
- (b) **Pellet-fueled wood burning heater** means any wood burning heater which is operated on compressed pellets of wood or other biomass material.
- (c) **U.S. EPA** means the United States Environmental Protection Agency.
- (d) **U.S. EPA Phase II Certified** means any appliance certified by the U.S. EPA to meet the performance and emission standards set forth in Title 40 CFR, Part 60, Subpart AAA or later revisions thereof.
- (e) **Visible emissions** mean any emissions of smoke which are visually perceived by an observer.
- (f) **Wood burning device** means any fireplace, freestanding fireplace, fireplace insert, wood stove, or other wood heater that burns wood or any other nongaseous or non-liquid fuels or any similar device burning any wood for aesthetic or space-heating purposes in any interior space. (Ord. 2397 § 1, 2012; Ord. 2398 § 1, 2012)

[Article 39A.02 GENERAL RESTRICTIONS](#)

[39A.02.010 Nuisance-Causing Wood burning prohibited.](#)

A person shall not discharge from any non-EPA compliant wood-burning source or non-wood pellet burning source whatsoever any visible quantities of smoke exceeding 20 minutes in any 4-hour period which cause injury, detriment, nuisance, or annoyance to any person or number of persons who reside within 300 ft of the wood burning source except as otherwise set forth in this chapter. (Ord. 2397 § 1, 2012; Ord. 2398 § 1, 2012)

[39A.02.020 Exemptions.](#)

The prohibition set forth in Section 39A.02.010 shall not apply to any of the following situations:

- (a) The use of a wood burning device when no gas or electrical service heating system is installed in the structure and the wood burning device is the sole source of interior heat for the structure.
- (b) The use of a wood burning device when electrical power service is not available, during times of temporary service outages.
- (c) The use of manufactured fire logs. (Ord. 2397 § 1, 2012; Ord. 2398 § 1, 2012)

[Article 39A.03 ENFORCEMENT](#)

[39A.03.010 Administrative citation.](#)

An administrative citation may be issued for any violation of this chapter pursuant to Davis Municipal Code Chapter 1, Article 1.02. The city shall only initiate an enforcement action for violation of this chapter pursuant to Article 1.02 following receipt of a resident complaint filed with the city and only after at least one warning notice for violation of this chapter has been delivered to the noncompliant party. (Ord. 2397 § 1, 2012; Ord. 2398 § 1, 2012)

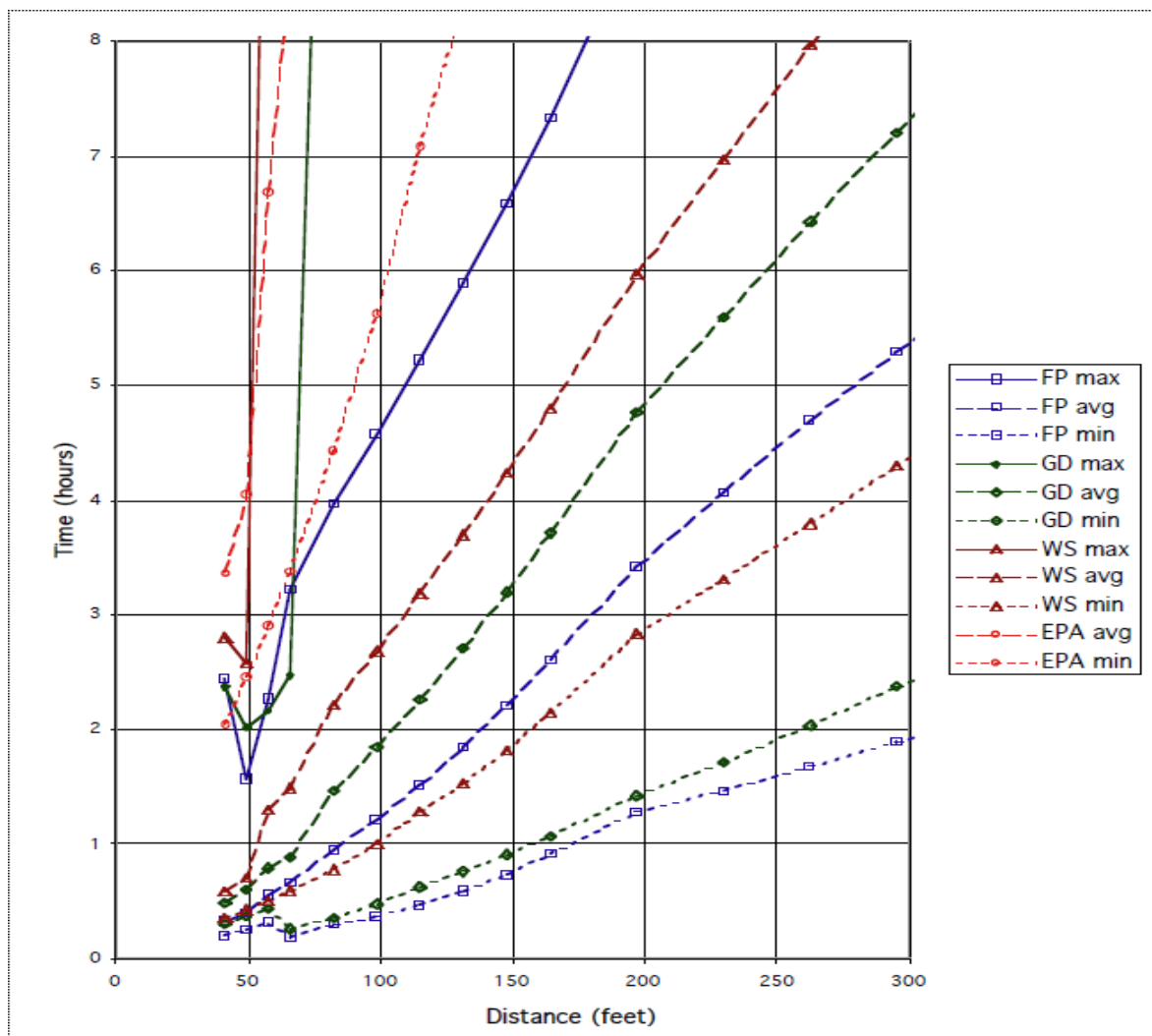
Appendix 2

Additional Discussion and Technical Justification of a Nuisance Ordinance Based on a Distance of a Wood Burning Device to an Affected Neighbor

The California Air Resources Board set an Air Quality Standard (CARB AQS) for 24-hour average concentration of particulate matter less than 10 microns (PM10). The likelihood that wood smoke will result in a health hazard is based on computer dispersion modeling and calculations showing that particulate levels will significantly exceed exposures expressed in California's 24-hour air quality standards.

In 2008, Dr. Robert Clear of Lawrence Berkeley Laboratory conducted computer modeling using an EPA-approved dispersion modeling program (Screen 3) on behalf of the City of Berkeley's Community Environmental Advisory Committee. This dispersion modeling indicated that particulate levels at any given distance from the wood smoke source vary significantly with chimney height, distance, type of wood atmospheric conditions etc, this study determined that even at 300 feet distance, the smoke plume could produce unhealthy air in excess of federal and state standards under worst case conditions within 2 hours.

Figure 1: Duration of use after which operation of a wood burning appliance causes particulates to exceed air quality standards. Maximums for EPA certified units exceeded the scale on the graph and are not shown.



Of the variables that affect wood smoke emissions, some are fixed by the design of the fireplace or its location, while others depend upon its operation or other conditions. Some of the variables, such as the efficiency of the fireplace, and the ambient temperature, typically had less than a 2% effect on the calculated particulate concentrations and are not very important, but as can be seen from figure 1, this was not true for all of them.

All calculations assume no structural obstructions between the source of smoke and the living space of the impacted neighbor. This somewhat underestimates the potential exposure because wood smoke dispersion can clearly exhibit downdraft accumulations increasing very localized wood smoke concentrations due to physical obstructions between the wood smoke source and downwind residents.

Another important finding from the modeling is that the highest particulate concentrations are predicted to occur at low air speeds, which means that the particulate matter is dispersed in all directions and it does not significantly matter where a complainant is located with respect to the source of the smoke. Hence, wind direction does not play an important role on whether a neighbor is impacted at low wind velocities.

These calculations showed that the 24-hour CARB Air Quality Standard might be exceeded in two hours for open hearth fireplaces at a distance of 300 feet, in one hour at a distance of 120 feet from a non-EPA compliant wood-burning devices, and at 40 feet, the particulate levels from most non-compliant wood burning appliances exceed the CARB Air Quality Standard in one half hour, and the worst-case fireplace exceeded it in 15 minutes. Accordingly, the proposed ordinance identifies burning of a non-EPA compliant wood-burning device may cause a nuisance to a resident within 300 feet of the wood burning source.

Appendix 3

Excerpts of Letters Received by the NRC from Davis Residents Affected by their Neighbor's Wood Burning and Other Comments

Citizen 1

"I never sent in a formal complaint, but my intersection was smokey four out of seven nights December through Feb. irregardless of whether the evening was calm or windy. The worst time was around ten o'clock at night and continued for several hours and sometimes through the night."

Citizen 2

"Everyone can appreciate the need for wheelchair ramps by direct observation, but people who don't feel pain in their lungs when breathing smoke don't have a way to observe that we're not all the same."

Citizen 3

"Considering our wonderfully moderate climate, burning wood is mostly done as either a hobby or for entertainment in my view. For example, when people refer to having a "traditional" fire on Christmas Eve, it is obvious that the activity is not entirely utilitarian (if at all). Are there other accepted hobbies and forms of entertainment in which neighbors poison each other?"

I continue to be dumbfounded that anyone would consider neighborhood wood smoke to only be detrimental on selected "no burn" days."

Citizen 4

"Most of the problem at my home originates with the neighbor who burns wood 24/7 in the winter months. He pays no attention at all to the "Don't Light Tonight" days. His house is located northwest of mine so, since most of our winter weather systems are out of the northwest, my house is in the direct path of his smoke. The problem is especially bad when there is a light 10-15 mph breeze out of the northwest. On those days I get more and stronger smoke than on the calm days. One morning this winter I was alarmed to look out my back window and see clouds of smoke drifting past the window only a few feet off the ground. When I went out to see if my house was on fire, I could see that the smoke was coming from the neighbor's chimney.

The "Don't Light Tonight" days, that are intended to help on calm days, don't solve the problem at all at my house. I would like to see the "Don't Light" restrictions in effect also on the days when there is a light 10-15 mph breeze. Those days are the worst at my home.

It has become obvious to me that some people will not voluntarily discontinue burning wood and will continue burning even on "Don't Light Tonight" dates."

Citizen 5

"We could smell smoke almost every night and morning!"

Citizen 6

"I and my asthmatic lungs just had to step inside from watching a lovely sunset because of wood smoke. The burners are starting early this year .

Breath easy, not everyone can!"

Citizen 7

"I have COPD and am very sensitive to any type of smoke. I like to sleep with my window open in the winter because the cold air helps my breathing. But when my neighbor starts wood-burning, this is impossible. I can't even work in my back yard or enjoy a neighborhood walk when they are burning."

Citizen 8

"When one house in our neighborhood starts using their fireplace in the evening, I have to take my kids inside because it will cause an asthma attack in my son. That is just not right"

Citizen 9

"My wife and I really enjoy neighborhood walks in the winter evenings - especially around Christmas time when all the lights are lit on our neighbors' houses. This last winter, though, a new renter moved in who insists on using their old fireplace every night. This makes the whole neighborhood stink and really causes my wife's respiratory problems to flare up. All of our jackets smell like wood smoke when we come in. The wood burning neighbors say it is not their fault and that everyone is doing it so they won't stop. But we never had the problem before they moved in last year."

Citizen 10

"Wood smoke plagues our neighborhood in Village Homes almost daily every winter, which makes our neighborhood one of the unhealthiest in Davis.

Everyday last winter when there was a no-burn advisory there were still people burning wood. There was so much smoke in our area that we had to put masking tape around our doors and windows. My wife has lung problems, and the wood smoke would cause her to have coughing fits. We were unable to take evening walks because every evening there was wood smoke in the air. Certainly not healthy for the young and the elderly and others with respiratory problems.

Appendix 4

Adverse Health Effects of Wood Smoke

California Air Resources Board News Release

January 22, 2009

New evidence supports efforts to curtail wintertime pollution problem.

Wood smoke is a serious threat to public health

Fireplace smoke is major source of winter time air pollution

SACRAMENTO: Today, the Air Resources Board heard the results of several studies that show smoke from wood fires aggravates lung and heart disease and increases the number of hospital admissions.

"Today's report to the Board underscores the need for air districts throughout the state to curtail fireplace burning when air quality is suffering," said ARB Chairman Mary Nichols. "This starkly illustrates our need to continue reducing particulate matter emissions."

At this morning's hearing, board members heard a presentation of research results that indicate exposure to wood smoke may reduce lung function and reduce the blood's ability to clot properly. In addition, wood smoke exposure may also increase substances in the body that lead to cardio-vascular and pulmonary inflammation.

These health threats could be particularly dangerous to those with preexisting heart or lung disease.

ARB research staff reviewed four recent national toxicological studies in presenting today's findings to the Board. The findings support fireplace ordinances that many local air districts throughout California are implementing.

The research found that wood smoke can cause a 10 percent increase of hospital admissions for respiratory problems among children. ARB estimates that between 20 to 80 percent of ambient wintertime particulate matter is due to wood smoke. Studies have found up to 70 percent of smoke from chimneys can re-enter a home or neighboring residences.

Wood smoke consists of several pollutants, including carbon monoxide, nitrogen dioxide, particulate matter and other irritating and toxic components. California's wood smoke problem and its pollution problem in general, are compounded by the state's geography and weather. The many valleys and calm air cause the pollutants to remain at ground level rather than be swept away."

From Yolo Solano AQMD Website (<http://ysaqmd.org/burn-woodstoves.php>)

Smoke from Fireplaces and Woodstoves

“During the winter months, some residents can be affected by smoke from fireplaces and wood burning appliances. Wood smoke particles (PM 2.5) are so tiny they seep into houses—even through closed doors and windows....

What pollutants are produced by wood stoves and fireplaces?

Wood stoves and fireplaces produce several types of pollution including particulate matter, carbon monoxide, organic gases, formaldehyde, and nitrogen oxides. These pollutants are known to cause numerous health problems including respiratory and cardiovascular illness and can contribute to atmospheric visibility problems and property damage. Of particular concern in our area are emissions of PM2.5 (fine particles). Fine Particulate Matter, known as PM2.5, is a complex mixture that may contain soot, smoke, metals, nitrates, sulfates, dust, water and tire rubber. It can be directly emitted, as in smoke from a fire, or it can form in the atmosphere from reactions of gases such as nitrogen oxides.

What can I do to reduce pollution from wood burning?

Wood smoke can harm your health. It can affect everyone, even neighbors who don't heat with wood. “

From Yolo Solano Wood Burning Informational Brochure

(http://ysaqmd.org/documents/LightitRight_09.pdf)

Don't Let Your Neighborhood's Health Go Up in Smoke!

“Wood burning produces particulate matter (PM) which consists of fine particles. PM from wood burning may include wood tars, unburned fuel, soot (unburned wood, and ash (unburnable materials. Smoke can also contain benzene, formaldehyde, and other toxic chemicals. PM can be trapped in your lungs for years, contributing to chronic lung disease and health problems.”

From Sacramento Air Quality Management District former Chairperson, Jeff Starsky

(Insights, Capital Public Radio November 21, 2006)

“This type of particulate matter can be very, very dangerous. Anyone... who goes for a walk on a cold evening and all the people in the neighborhood are firing up their fireplaces, they can taste it, they can feel it, it chokes their breathing, it is that noticeable”

From Staff Report on San Joaquin Valley Air Pollution Control District Rule 4901 - Wood Burning Fireplaces-Stoves, June 19, 2003.

“Both PM10 and PM2.5 create health problems related to their ability to penetrate deep into our respiratory system. A number of health studies have established a direct correlation between elevated particulate levels and increased mortality.

Children, the elderly, pregnant women and people with respiratory ailments are especially susceptible. Among the health impacts are premature death; respiratory-related hospital admissions; aggravated asthma; acute respiratory symptoms, including aggravated coughing and difficult breathing; chronic bronchitis; and decreased lung function that can be experienced as shortness of breath.

Even if you don't burn wood, studies have shown that wood smoke from neighbors' fires can enter your home. Smoke particles are so small they can seep into a home with closed windows and doors. The pollution levels inside a closed home can be up to 70 percent of the levels outdoors".